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## Notes on Costa Rican Aquifoliaceae

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**ABSTRACT.** Work toward a revision of the Costa Rican Aquifoliaceae has revealed several nomenclatural problems and undescribed species. In this paper, *Ilex skutchii* Edwin ex Dudley & W. J. Hahn is validly published, *Euonymus haberi* Lundell is transferred to *Ilex*, and *Ilex hemiepiphytica* W. J. Hahn is newly described.

### 1. *ILEX SKUTCHII*

A large and locally abundant species of *Ilex* has long been known to biologists at the Organization for Tropical Studies (OTS) research station at La Selva, Heredia Province, Costa Rica. Until recently, however, this species was represented in herbaria by only a few depauperate collections. This taxon is found throughout the lowlands of northern Atlantic slope Costa Rica and adjacent Nicaragua and has generally been referred to as *Ilex skutchii*, a name first set in print by Gabriel Edwin (1964) in his unpublished doctoral dissertation. The late Theodore Dudley, formerly of the US National Herbarium, had intended to validate this name along with several infrageneric categories discussed by Edwin, but was unable to do so before his unfortunate demise. As a further complication, another unpublished name, *Ilex locuples* L. O. Williams & Standley, is found on herbarium specimens of the same taxon collected in nearby Taus, Cartago Province, Costa Rica. Floristic projects for La Selva, Costa Rica, and Nicaragua have produced many new specimens of this taxon, giving a better understanding of its delimitation and relationships as well as allowing for the following formal description.

***Ilex skutchii*** Edwin ex T. R. Dudley & W. J. Hahn, sp. nov. TYPE: Costa Rica. San Jose: vicinity of El General, 670 m, Jan. 1939, A. F. Skutch 4086 (holotype, US; isotype, K).

Ex affinitate *I. tectonica* ab utroque praecipue natura foliorum, laminis chartaceis, bicoloribus, apicibus apiculatis, venationibus viridis, pedunculis et pedicellis gracilibus, etiam fructibus ovoideis.

Shrub to very large tree, 1.5–40 m tall, trunk to 1 m DBH; sparingly to moderately branched. Stems

angulate becoming less so with age, minutely gray-puberulent becoming glabrous with age, drying brown or dark brown; lenticels scattered on older growth, circular to elliptic, 0.1–0.2 mm long; bark yellowish, in age turning gray to dark gray, relatively smooth. Leaves chartaceous, glabrous, occasionally with small amounts of brown pubescence on the abaxial midrib, green, sometimes glaucous, drying olive-green to dark green or brown adaxially, abaxially tan or pale brown, epunctate or essentially so, symmetrical to slightly asymmetrically elliptic or narrowly elliptic, sometimes obovate, 4.0–6.0 cm long, 2.0–3.0 cm wide, apex acute to acuminate, sometimes obtuse to rounded, base cuneate to slightly attenuate, margins essentially entire, sometimes irregular; venation brochidodromous, veins apparent, same color as the blade; petioles 0.5–1.5 cm long, usually thickened, frequently drying dark, puberulent becoming glabrous with age; stipules triangular, thickened, similar to the bark, 0.5 mm long. Staminate inflorescences of densely fasciculate, compound dichasia, clustered on a reduced stem resembling a panicle, stem elongating after anthesis and the infructescences solitary; dichasia branched to 2 or 3 orders with 3–7 flowers per dichasium; bracts acute triangular-ovate, 0.4–0.7 mm long, 0.7–0.9 mm wide, coriaceous; peduncles 3.0–9.0 mm long, 0.4–0.8 mm wide, flattened in cross section, very thin and usually curled; peduncular bracts thin-triangular, 0.1–0.4 mm long, ca. 0.2 mm wide, membranous; rachis, when present, 1.0–3.0 mm long, 0.3–0.6 mm wide; bracteoles, when present, thin-triangular, 0.1–0.2 mm long; pedicels 1.0–3.0 mm long, 0.2–0.5 mm wide; floral bracteoles sometimes present, oppositely paired midway along the pedicels. Pistillate inflorescences of reduced dichasia clustered on a much reduced stem resembling a cyme, stem later elongating and the fruiting dichasia then lateral or axillary; dichasia unbranched, one flower per dichasium; bracts broadly triangular-ovate, 0.7–1.8 mm long, 0.9–1.5 mm wide, coriaceous; peduncles 0.3–1.5 cm long, 0.4–0.8 mm wide, flattened in cross section; peduncular bracts empty, slightly offset at the first furcation, triangular, 0.1–

0.4 mm long, membranaceous; pedicel 2.0–4.0 mm long, 0.3–0.6 mm wide; floral bracteoles obscure or absent. Staminate flowers 4(rarely 5)-merous; calyx open cupuliform, sepals essentially glabrous, deltoid, acute, 0.8–1.0 mm long, 0.8–1.0 mm wide, margins entire or slightly irregular; corolla rotate, petals white, glabrous or with a few scattered hairs, widely ovate at the base, rounded-acute at the apex, 1.5–2.5 mm long, 1.0–2.0 mm wide, margins entire to ciliate; filaments 1.5–2.5 mm long, filiform, anthers yellow, oblong, 1.0–1.5 mm long; pistillodium pulvinate, 0.5 mm diam., stigma rudimentary and small. Pistillate flowers 4(5)-merous; calyx open cupuliform, the sepals glabrous, deltoid, acute, 1.0–2.0 mm long, 0.7–1.5 mm wide, margins entire; corolla rotate, petals white, glabrous or with a few scattered hairs, widely ovate at the base, apices acute, 1.5–2.5 mm long, 0.8–1.8 mm wide, margins entire; filaments 1.0–1.5 mm long, filiform, aborted anthers 1.0 mm long, irregular in form; ovary subglobose, 1.5–2.0 mm long, stigma 2.0–4.0 mm long, lobed-capitate. Fruit spherical to subglobose, 2.5–3.5 mm long, 3.0–4.0 mm diam.; pericarp slightly leathery, 0.5 mm thick, purple, stigma spreading, 1.0–2.0 mm diam.; mesocarp fleshy to juicy; pyrenes 4(5), trigonal, 2.0–3.0 mm long, 1.5–2.5 mm wide, adaxially smooth, endocarp ligneous.

*Common name.* Campana.

Frequent to common in moist to wet forest at mid to low elevations in the northern Atlantic slope of Costa Rica and southeastern Nicaragua. This species is one of the most common trees at the La Selva OTS research station. The specific epithet honors Alexander Skutch (1904–), noted Costa Rican naturalist and collector of the type specimen.

*Additional specimens examined.* COSTA RICA. **Alajuela:** Parque Nacional Rincon de la Vieja, Colonia Blanca, Quebrada Leira, 4 km aguas arriba del limite este del Parque, 10°47'39"N, 85°16'36"W, 1000–1200 m, 4/14/1991, G. Rivera & C. Schramm 1266 (CR, MO, US). **Cartago:** Taus, 750 m, 03/11/51, J. Leon 3164 (F). **Guanacaste:** Estacion Pitilla, La Cruz, Parque Nacional Guanacaste, 10°59'26"N, 85°25'40"W, 700–1000 m, 10/10/1990, C. Moraga 129 (CR, MO, US). **Heredia:** Finca La Selva, the OTS Field Station on the Rio Puerto Viejo just E of its junction with the Rio Sarapiquí, 470 m, 06/09/83, I. A. Chacon G. 904 (DUKE, MO, US); Finca La Selva, near confluence of Rio Sarapiquí with Rio Puerto Viejo, 84°02'W, 10°25'N, 125 m, 07/04/85, B. Hammel & M. Grayum 14124 (MO); Finca La Selva, near SE corner of property, 84°01'W, 10°26'N, 07/20/70, G. S. Hartshorn 919 (F); Successional Plots, Sendero Sabalo Esquina, 100 m, 06/07/84, B. Jacobs 2750 (MO); Finca La Selva, Southern boundary trail, about 400 m, 05/16/85, R. L. Wilbur 36896 (DUKE, MO). **San Jose:** vicinity of San Sebastian, S of San Jose, 1160 m, 2/23/1926, P. C. Standley 49325 (US). NICARAGUA. **Chontales:** 4 km al NW de Santo Domingo, Aranda et al. 83 (MO).

The species belongs to the *Ilex guianensis* (Aublet) O. Kuntze species complex as discussed by Hahn (1988, 1993). Originally, the one known collection of *I. skutchii* from Nicaragua (Aranda et al. 83) was placed in *I. tectonica* W. J. Hahn due to an incomplete delimitation of that taxon. The presence of discolorous, chartaceous leaves, slightly apiculate at the apex, greenish veins, thin recurved peduncles and pedicels, and ellipsoid fruits distinguish *I. skutchii* from *I. tectonica*, which has a more northerly distribution. Given the potential for misidentification, a revised key to the Central American members of the *Ilex guianensis* species complex is presented below.

#### KEY TO THE *ILEX GUIANENSIS* COMPLEX IN CENTRAL AMERICA

1. Leaves variable but usually spatulate, coriaceous to leathery, frequently shiny above, glaucous, glabrous, apex usually obtuse or retuse, sometimes slightly acute, margins usually revolute; venation usually obscure; new stems drying gray or green; coastal scrub inland savannas, occasionally moist forests and disturbed upland clearings; Atlantic coast of Central America and northern South America, Greater Antilles, and the Gulf of Panama; not known from Costa Rica . . . . . *Ilex guianensis* (Aublet) O. Kuntze
- 1'. Leaves elliptic to ovate or obovate, chartaceous, opaque above, glabrous to lightly pubescent, apex usually acute to apiculate, margins flat, venation apparent to distinct; new stems drying green to dark brown or black . . . . . 2
2. Young stems drying brown with white lenticels; secondary leaf venation distinct, reticulate, veins yellow, peduncles and pedicels rigid, erect, ca. 1.0–1.8 mm diam.; stigmatic residue spreading, not prominent in profile above the pericarp; Honduras, Belize, and Nicaragua . . . . . *Ilex tectonica* W. J. Hahn
- 2'. Leaf venation apparent but not distinct, veins the same color as the leaves, peduncles and pedicels erect or recurved; stigmatic residue prominent. . . 3
3. Young stems drying green or light brown; peduncles and pedicels usually recurved, ca. 0.5 mm diam.; fruits spherical to globose; southeastern Nicaragua and northeastern Costa Rica . . . . . *Ilex skutchii* (Edwin) T. R. Dudley & W. J. Hahn
- 3'. Young stems drying black, peduncles and pedicels generally erect, ca. 1.0–1.5 mm diam.; fruits spherical; limestone forests of Yucatán, Mexico, to Honduras along the Atlantic coast . . . . . *Ilex belizensis* Lundell

#### 2. *ILEX HABERI*

Intensive collecting in the Monteverde Cloud Forest Reserve and vicinity by William Haber and collaborators has produced many new specimens, including material of an inconspicuous mid-elevation tree, which has been described as *Euonymus haberi* Lundell (1981). A close examination of the

type material has shown this to be a member of the genus *Ilex*, as indicated by the lack of a staminal disc, the distinctly alternate leaves, a typical sigmoid venation pattern, and dioecious plants. Additional collections including fruiting material now permit a more complete description.

***Ilex haberi*** (Lundell) W. J. Hahn, comb. nov. Basionym: *Euonymus haberi* Lundell, *Phytologia* 48: 131. 1981. TYPE: Costa Rica. Prov. Puntarenas: Monteverde, lower community, elev. 1300 m, 16 Apr. 1979, W. Haber 313 (holotype, LL; isotype, MO).

Tree 10–35 m tall. Stems ridged to terete, mostly glabrous, drying gray green or brown; lenticels scattered to numerous, white, round or oval, ca. 1.0 mm long; bark smooth to somewhat ridged, medium to dark gray. Leaves chartaceous, often conduplicate, drying dark green adaxially, pale green abaxially, epunctate, glabrous, elliptic to ovate, 3.0–8.0 cm long, 1.8–3.5 cm wide, acute to apiculate, attenuate, margins irregular; venation brochidodromous, secondary veins indistinct, tertiary veins diffuse-reticulate, inconspicuous; petioles 0.5–1.5 cm long, 1.0–2.0 mm diam.; stipules paired at the base of the petiole, deciduous, thin-triangular, ca. 0.5 mm long. Staminate inflorescence of solitary, axillary dichasia on recently expanded branches, dichasia usually branched to 2 orders, 3–7(–10) flowers per dichasium; bracts ca. 0.1 mm long and wide; peduncles 3.0–9.0 mm long, ca. 0.5 mm diam., flattened in cross section, peduncular bracts minute or obsolete; pedicels 3.0–4.0 mm long, 0.2–0.3 mm diam., slightly flattened in cross section; floral bracteoles minute. Pistillate inflorescence of solitary, axillary dichasia on recently expanded branches, dichasia reduced, unbranched, one flower per dichasium; bracts ovate, ca. 1.0 mm long and wide; peduncles 2.0–5.0 mm long, flattened in cross section; peduncular bracts empty, oppositely paired, triangular, ca. 1.0 mm long; pedicels continuous with the peduncle, 0.2–1.0 cm long, 0.6–1.5 mm diam., flattened in cross section; floral bracteoles absent or obsolete. Staminate flowers 4-merous, open cupular; sepals glabrous or with a few white hairs, deltoid, apices acute, 1.0 mm long, 1.0–1.5 mm wide, margins irregular; corolla rotate, petals white, glabrous or with a few white hairs, oblong-elliptic, 2.0–2.5 mm long, 1.5–2.0 mm wide, margins irregularly ciliate; filaments 2.0–4.0 mm long, inflexed, anthers ovoid, 1.5 mm long, 1.0 mm wide; pistillodium very small and pulvinate, stigmas rudimentary. Pistillate flowers 4-merous; calyx open cupuliform, sepals glabrous or essen-

tially so, broadly ovoid, 1.0–2.0 mm long, 2.0–3.0 mm wide, margins entire or slightly irregular; corolla rotate, petals white, glabrous or with a few small white hairs, rhomboid-ovoid, 2.5–3.5 mm long, 3.0–3.5 mm wide, margins irregularly ciliate; staminodia irregular, filaments 1.0–1.2 mm long, strap-shaped, anthers irregularly ovoid, 0.5 mm long; gynoecium conical-ovoid, lightly beset with short white hairs, stigma capitate. Fruit unknown.

*Common name.* Campana.

The affinities of *Ilex haberi* are not certain. Superficially, the plant resembles *I. skutchii* but the production of flowers on new wood would instead group this species with two other Costa Rican taxa: *Ilex pallida* Standley and *Ilex costaricensis* G. D. Smith. This inflorescence type is the equivalent of the “solitary flowering unit composed of secondary dichasia” as described by Loizeau and Spichiger (1992).

*Additional specimens examined.* COSTA RICA. **Guanacaste:** Canton de Tilaran, San Rafael to El Dos de Tilaran, W. Haber et al. 11058 (CR, MO, US). **Puntarenas:** Canton de Puntarenas, Santa Elena de Monteverde, W. Haber et al. 11047 (CR, MO, US).

### 3. *ILEX HEMIEPIPHYTICA*

The Paltoria group of *Ilex* is one of the most clearly defined species groups in the genus although the component species exhibit some of the most complicated patterns of variation. Many intergradations between described species are known, and considerable clinal or geographic variation has been noted. A relatively well collected hemiepiphytic taxon is known from the upland of central Costa Rica and differs from previously described members of this species group by a number of characters.

***Ilex hemiepiphytica*** W. J. Hahn, sp. nov. TYPE: Costa Rica. Heredia: vicinity of Vara Blanca, N slope of Central Cordillera, between Poas and Barba volcanoes, 1430 m, 3/1938, A. F. Skutch 3729 (holotype, MO).

Ab *I. yurumanguini* et *I. chiriquensi* habitu epiphytico vel hemiepiphytico, etiam foliis tenuioribus, laminis ellipticis pro rata angustioribus, etiam pedunculis et pedicellis gracilioribus differt.

Tree to 18 m tall, sometimes epiphytic, laxly ramified, branches arching or pendulous, leaves present only toward apices of stems. Stems slightly angulate, glabrous; lenticels scattered on new stems, oval, 1.0 mm long, 0.5 mm wide, whitish; bark fissured, yellowish brown turning gray in age. Leaves coriaceous, drying dark green adaxially,

pale olive or yellowish green abaxially, pubescent with scattered white or gray hairs, becoming glabrous with age, punctate abaxially, punctations poorly developed and scattered, elliptic-obcordate to obovate, 9.0–13 cm long, 4.0–7.5 cm wide, apiculate to obtuse-caudate, attenuate, cuneate, margins crenulate to subentire with a minute spine at the tip of each crenation, slightly revolute to flat; venation brochidodromous with 6–8 pairs of distinct secondary veins per side, tertiary veins distinct, reticulate; petioles 0.5–1.0 cm long, 1.5–3.5 mm diam., glabrous; stipules thick, triangular, ca. 1.0 mm long, sometimes with a spinulose apex, scarcely differentiated from the bark. Staminate inflorescences of compound dichasia borne on a much reduced stem, appearing as an axillary panicle or umbel; dichasia branched to 2 or 3 orders, 3–7 flowers per dichasium; bracts chartaceous, narrow triangular, ca. 1.0 mm long, 0.5 mm wide; peduncles filiform, 0.5–1.5 cm long, 0.1–0.3 mm wide, slightly flattened or angled in cross section; peduncular bracts thin-triangular, 0.1–0.2 mm long, opposite or offset; pedicels 1.0–6.0 mm long, 0.1–2.0 mm wide; floral bracteoles obsolete. Pistillate inflorescences of reduced dichasia borne on a much reduced stem appearing as an axillary cyme or umbel; dichasia unbranched, 1 flower per dichasium; bracts thin-triangular, ca. 1.0 mm long, 0.5 mm wide, thin coriaceous; peduncles 0.2–0.7 cm long, 0.2–0.4 mm wide, slightly angled in cross section; peduncular bracts thin triangular, 0.1–0.2 mm long, opposite or decidedly offset; pedicel 1.0–8.0 mm long, 0.2 mm wide; floral bracteoles not evident. Staminate flowers 4-merous; calyx cupuliform, sepals yellowish white, glabrous, triangular, somewhat involute, 0.8–1.0 mm long, 1.0 mm wide, margins entire to irregularly divided; corolla rotate, petals white, glabrous, elliptic-oblong, somewhat spatulate, apiculate to short acuminate, 2.0–3.0 mm long, 3.0 mm wide, margin entire; filaments filiform, 1.5–2.0 mm long, anthers yellow, ovate-oblong, 0.8–1.2 mm long, 0.2–0.4 mm wide; pistilodidium conical-ovoid, 1.0 mm long, 0.6 mm diam., stigmas conical. Pistillate flowers 4-merous; calyx cupuliform, sepals glabrous, obtuse, 0.3 mm long, 0.3 mm wide, induplicately folded, margins entire; corolla rotate, petals white, glabrous, 1.2–1.8 mm long, 0.4–0.8 mm wide, margins entire; filaments 0.5–0.8 mm long, 0.1 mm wide, anthers irregular, ca. 0.5 mm long; gynoecium ovate-conical, stigma flattened-capitate. Fruit globose, 4.0 mm long, 4.0 mm diam.; pericarp thin, crustaceous, bright red to purple at maturity, stigma spreading, indistinct in

fruit; mesocarp thin; immature pyrenes 4, trigonal, ca. 2.5–3.0 mm long, 1.0 mm wide, abaxially smooth, the endocarp ligneous.

*Ilex hemiepiphytica* is a member of the *Paltoria* group, as evidenced by the punctate, coriaceous leaves and inflorescences and infructescences on abbreviated shoots. *Ilex hemiepiphytica* is distinguished from *I. yurumanguinis* Cuatrecasas by its epiphytic or hemiepiphytic habit, its thin coriaceous, narrowly elliptic and generally smaller leaves with the margins only slightly revolute or flat and not as distinctly crenulate, thinner peduncles and pedicels, and occurrence at higher elevations, usually above 1000 m. *Ilex chiriquensis* Standley of Panama differs in its more orbicular, thicker leaves with distinctly revolute and crenulate margins, and shorter, stouter pedicels and peduncles.

Flowering of *I. hemiepiphytica* occurs in October to December with fruiting in May to July.

*Additional specimens examined.* COSTA RICA. **Cartago:** San Gerardo, 5 km NW of crater of Irazu, 2000 m, 02/01/83, L. D. Gomez 19916 (CR, MO). **Heredia:** vicinity of water filled crater (indicated as dry on map) NE of summit of Volcan Barva and SE of Laguna Danta, 84°06'W, 10°08'N, 2500 m, 04/26/86, M. H. Grayum et al. 7403 (MO); NW slope of Volcan Barva between Laguna del Barva and base of Cerros Las Marias, 84°07'W, 10°08'N, 2600 m, 04/28/86, M. H. Grayum 7473 (MO). **Puntarenas:** Monteverde, 10°20'N, 84°50'W, 1400 m, 29 Nov. 85, W. Haber & E. Bello 3607 (CR, MO, US); Monteverde, 10°20'N, 84°50'W, 9 June 86, W. Haber & E. Bello 5047 (CR, MO, US); Monteverde Cloud Forest Reserve, 10°20'N, 84°50'W, 13 Oct. 86, W. Haber & E. Bello 5939 (CR, MO, US); Reserva Biologica Monteverde, Oja e Agua, Finca Alvarado, 10°15'N, 84°46'W, 17 Nov. 87, W. Haber & E. Bello 7773 (CR, MO, US); Monteverde Reserve, 2 km SW of Station, 10°28'N, 84°48'W, 1500–1550 m, S. Ingram & K. Ferrell-Ingram 1713 (SEL, US).

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